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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

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TM 002 226

Development of USES Aptitude Test Battery for Machine Operator, Mass Mailing

(clerical) 234.885

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Technical Report on Development of USES Aptitude Test Battery

For .....

Machine Operator, Mass Mailing (clerical) 234.885 (1-25.411)

S-376

U. S. Employment Service
in Cooperation with
Iowa State Employment Service

May 1966

GATB Study #2602

DEVELOPMENT OF USES APTITUDE TEST BATTERY

For

Machine Operator, Mass Mailing 234.885 (1-25.411)

S-376

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Machine Operator, Mass Mailing 234.885. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB, B-1002 Scores
P - Form Perception	90
K - Motor Coordination	95
M - Manual Dexterity	90

RESEARCH SUMMARY

Sample:

51 female workers employed by O. E. McIntyre, Inc., at Mt. Pleasant, Iowa.

Criterion:

Production records.

Design:

Longitudinal (tests administered before work experience and before criterion collection).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, aptitude-criterion correlations, and selective efficiencies.

Predictive Validity:

Phi Coefficient = .67 ($P/2 < .0005$)

Effectiveness of Norms:

Only 65 percent of the non-test selected workers used for this study were good workers; if the workers had been test selected with the above norms, 90 percent would have been good workers. 35 percent of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 10 percent would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	65%	90%
Poor Workers	35%	10%

SAMPLE DESCRIPTION

Size: N=51

Occupational Status: Employed workers

Work Setting: Workers were employed at O. E. McIntyre, Inc., Mt. Pleasant, Iowa (new plant opening - all workers in sample began work within a two-week period).

Employer Selection Requirements:

Education: No requirement
Previous Experience: None
Tests: No tests used
Other: Physical examination, application blank, and personal interview

Principal Activities: The job duties for each worker are comparable to those shown in the job description in the Appendix.

Minimum Experience: All workers in the sample had completed at least 3 months experience on the job before criterion collection.

TABLE 2

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age and Education.

	Mean	S D	Range	r
Age (years)	30.0	10.9	17-55	.148
Education (years)	11.2	1.3	7-12	-.036

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B, using NCS answer sheets, were administered during the period February 11, 1964 to April 20, 1964.

CRITERION

The criterion data consisted of production records which considered both quantity and quality of work. Production data is constantly recorded and performance for the 4th month on the job for each worker was used as a basis for the criterion.

Production is recorded with reference to product being inserted, number of enclosures and operator's number for each shift. Production figures may be read from dials on the machines or taken from the work order control sheet. Quality is noted in terms of finished product appearance and the amount of rejected or wasted material.

Production and quality standards vary according to the degree of difficulty of the product being inserted, number of insertions being made and the customer's quality standards. Final criterion scores were made by assigning points for quality and quantity to each worker according to her record for a one month period. Such scaling is a standard production procedure and is completed each month.

Criterion Score Distribution:	Possible Range:	0-60
	Actual Range:	14-56
	Mean	35.3
	Standard Deviation:	10.0

Criterion Dichotomy: The criterion distribution was dichotomized into low and high groups by placing 35 percent of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal.

Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers".

APTITUDES CONSIDERED FOR INCLUSION IN THE TEST NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitude Q which does not have a significant correlation with the criterion was considered for inclusion in the norms because the qualitative analysis indicated that it was important for the job duties and the sample had a relatively high mean score on this aptitude. Tables 3, 4 and 5 show the results of the qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performed)

Aptitude	Rationale
Q - Clerical Perception	Necessary in keeping production and control records, in sorting addresses, and in preparing mail bag slips and tags.
P - Form Perception	Necessary in visually inspecting appearance of envelopes, and in insuring proper affixing of address labels, coupons or stamps.
K - Motor Coordination	Necessary in efficiently tending machine, making adjustments and handling materials.
F - Finger Dexterity	Necessary in intricate finger movements involved in machine adjustment and address sorting.
M - Manual Dexterity	Necessary in handling materials, jogging papers, filling feedboxes, placing bundled envelopes in mail bags, etc.

TABLE 4

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

	Mean	SD	Range	r
G - General Learning Ability	99.0	11.7	74-138	.334*
V - Verbal Aptitude	97.6	12.1	70-125	.199
N - Numerical Aptitude	97.6	15.9	53-134	.258
S - Spatial Aptitude	100.4	14.7	68-140	.245
P - Form Perception	108.2	16.9	72-145	.620**
Q - Clerical Perception	122.5	18.1	89-172	.191
K - Motor Coordination	105.7	15.5	74-146	.613**
F - Finger Dexterity	103.2	16.8	58-135	.520**
M - Manual Dexterity	105.7	21.6	65-159	.752**

* Significant at the .05 level
** Significant at the .01 level

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important					X	X	X	X	X
Irrelevant									
Relatively High Mean					X	X	X		X
Significantly Low Standard Dev	X	X		X					
Significant Correlation with Criterion	X				X		X	X	X
Aptitudes to be Considered for Trial Norms	G				P	Q	K	F	M

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of Aptitudes G, P, Q, K, F and M at trial cutting scores were able to differentiate between the 65% of the sample considered good workers and the 35% of the sample considered poor workers. Trial cutting scores at five point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For two-aptitude trial norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about 1/3 of the sample; for four-aptitude trial norms, cutting scores of slightly less than one standard deviation will eliminate about 1/3 of the sample. The Phi Coefficient was used as the basis for comparing trial norms. Norms of P-90, K-95 and M-90 provided the highest degree of differentiation for three-aptitude norms. The addition of a fourth aptitude (G) gave slightly better differentiation but the increase was not sufficient to justify the use of a fourth aptitude. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .67 (statistically significant at the .005 level).

TABLE 6

Concurrent Validity of Test Norms, **P-90, K-95 and M-90**

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	**5**	**28**	33
Poor Workers	15	3	18
Total	**20**	**31**	51

Phi Coefficient (ϕ) = **.67**
Chi Square (X^2) = **22.69**
Significance Level = $P/2 < .0005$

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-**30** which is shown in Section II of the Manual for the General Aptitude Test Battery.

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FACT SHEET

Job Title: Machine Operator, Mass Mailing (clerical) 234.885 (1-25.411)

Job Summary: Operates labeling, inserting-sealing and tying machines to prepare advertising promotional material for mailing.

Work Performed: Operates labeling machine to affix address labels to envelopes or other printed materials. Studies job order. Threads pertinent address labels into machine. Takes envelopes or printed material from stack near machine, jogs materials on work table to even edges for easy pick up and places materials in machine hopper. Tends machine which cuts and glues address labels automatically. Replenishes materials to be labelled. Removes addressed envelopes or printed materials from conveyor belt, visually scans for address order, sorts and distributes finished materials in boxes according to destination.

Operates inserting machine to collate, gather and insert printed materials into pre-addressed or window envelopes and seal envelope slaps for mailing. Notes quantity of Inserts desired. Fills all feedboxes with inserts in approved order, jogging materials for eveness and bending or folding to facilitate pick-up. Tends machine, takes corrective action when machine stops automatically, indicating omission of insert or crumpled materials. Adjusts machine as necessary, replaces omitted insert manually, removes crumpled material, restarts machine by pressing button. Adds water to moistener, as required, manipulating brush to insure flexibility. Replenishes glue supply of glue tip used to affix coupons to materials. Inspects completed order, makes appropriate entry on Control Sheet showing machine start and stop count, prepares mail-bag slip showing order number, drop date and destination and prepares mail bag tag which is inserted in metal holder on mail bag to indicate job order number and destination.

Operates tying machine to secure bundled envelopes for mailing. Picks up bundle of approximately 50 envelopes, arranged so that address is facing out on each side of bundle. Places bundle over slot on tying machine. Depresses foot pedal, activating machine which wraps, ties, and cuts string. Positions bundle to allow for cross tying. Places tied bundle in appropriate mail-bag according to destination.

Maintains appearance of work area. discarding crumpled materials, empty boxes, or other waste materials in trash boxes.

(This sheet is printed in duplicate. One copy should remain as part of the Appendix in order to complete the technical report. The other copy can be removed by employment service personnel who wish to set up separate fact sheet files.)

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